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ABSTRACT

Reported are the results of a National Science Foundation-sponsored survey conducted by the Higher Education Panel of the American Council on Education. For this survey, the Council asked the 535 2- and 4-year colleges belonging to the Panel how many full-time faculty they hired in 1976-77 in selected fields, the proportion of those hired who had doctorates, and how these proportions might change in the future. The Council weighted data supplied by the 84% of the institutions which responded to obtain estimates describing the hiring practices and plans of all United States 2- and 4-year institutions. (Author/BB)

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SCIENCE RESOURCES STUDIES HIGHLIGHTS

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Hiring of Science and Engineering Faculty by 2- and 4-Year Colleges

Reported here are the results of a National Science Foundation-sponsored survey conducted by the Higher Education Panel of the American Council on Education (ACE). The Higher Education Panel is an ongoing survey research program—primarily supported by Federal funds—based on a stratified sample of 760 of the more than 3,000 colleges and universities in the United States. For this survey the Council asked the 535 2- and 4-year colleges belonging to the Panel how many full-time faculty they hired in 1976-77 in selected fields, the proportions of these hires who had doctorates, and how these proportions might change in the future. The Council weighted data supplied by the 84 percent of the institutions which responded to obtain estimates describing the hiring practices and plans of all U.S. 2- and 4-year institutions.

Assessment Highlights

- In 4-year colleges about 63 percent of new full-time hires had doctorates or were expected to receive them soon after employment, whereas only 12 percent of new 2-year college faculty had such academic credentials. Science and engineering (S/E) fields also varied with the physical and social sciences having the most doctorates relative to total hires, and agriculture and natural resources, biological sciences, and engineering, the fewest. Many expected these percentages to be higher because of a presumption that 2- and 4-year colleges prefer to appoint faculty who have doctorates.

- For each of the five broad S/E fields, over one-half of the responding 4-year colleges expected no change over the next five years in the proportions of new faculty with doctorates. Somewhat larger percentages of responding 2-year institutions expected no change. In the remaining cases, at both levels, administrators anticipated increases much more frequently than they anticipated decreases. Thus, some small increases in the proportions of academic hires with doctorates seem probable nationwide as a result of the upgrading of faculty credentials by a minority of institutions.

Introduction

The National Science Foundation asked ACE to conduct this survey to obtain otherwise unavailable information needed for a better understanding of current and future markets for S/E doctorates in academia. Until this survey was completed very little data existed on the academic credentials of new S/E faculty in 2- and 4-year schools. Many people presumed that 2- and 4-year colleges generally prefer doctorates for their faculties and if doctorates are available, as the reports of the poor university job market indicate, they would be hired in much greater numbers than nondoctorates. The survey showed this presumption to be incorrect.

In January 1977, 2- and 4-year academic institutions employed 76,166 full-time scientists and engineers of whom 36,938, or 48 percent, held no more than a bachelor's or master's degree. At 2-year colleges 82 percent of total full-time faculty had not earned doctoral degrees. The corresponding figure for 4-year colleges was 31 percent.[1] According to the survey, doctorates accounted for smaller shares of new faculty appointments than they did of total full-time faculty.

Other Federal agencies—The Office of Education, the National Institutes of Health, and the National Center for Education Statistics—cooperated in the planning for this survey. Because of their involvement, the survey questionnaire also requested information on fields other than science and engineering. For purposes of comparison, results for two of these additional fields are also reported in this *Highlights*.[2]

[1] National Science Foundation, *Detailed Statistical Tables, Manpower Resources for Scientific Activities at Universities and Colleges, January 1977* (NSF 77-321) (Washington, D.C. 20550).

[2] For further survey results, see Frank J. Atelsek and Irene L. Gomberg, *New Full-Time Faculty 1976-77: Hiring Patterns by Field and Educational Attainment* (Washington, D.C.: American Council on Education, March 1978).

Prepared in the Supply and Education Analysis Group, Division of Science Resources Studies.

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Findings

THE REPRESENTATION OF DOCTORATES AMONG HIRES IN 1976-77 SCHOOL YEAR

Each institution responding to the survey indicated the number of new regular full-time faculty appointed during the 1976-77 academic year in each of several fields. The survey questionnaire requested that only those appointees who had never previously been employed as full-time faculty at any institution of higher education be counted. This eliminated any experienced faculty transferring from one school to another. Respondents also reported the number of "new hires" who had either already earned a doctorate or were likely to do so within a year or two of appointment. ACE weighted the survey replies to obtain estimates for approximately 2,800 colleges.

The varying degrees of doctorate representation among new hires at the two levels is striking, particularly in engineering with about 52 percent of hires with doctorates at 4-year colleges versus 2 percent for 2-year institutions and in the life sciences with 49 percent and 4 percent, respectively. The social sciences accounted for the greatest number of S/E doctorates hired by community and junior colleges as well as by 4-year institutions. Publicly supported institutions hired 48 percent of the new S/E faculty (including nondoctorates) at 4-year schools and 94 percent at 2-year level. Private 4-year colleges hired a larger proportion of their new S/E faculty with doctorates than did their publicly supported counterparts (68 percent versus 58 percent).

Estimated number of new faculty members appointed in 1976-77

Field[1]	4-year colleges[2]			2-year colleges		
	Total new appointments	Percent of appointees with doctorates	Confidence interval of percent[3]	Total new appointments	Percent of appointees with doctorates	Confidence interval of percent[3]
Total, science and engineering	3,791	63.1	2.6	2,175	11.5	3.3
Physical sciences	687	70.6	4.6	211	25.6	12.6
Social sciences	1,474	70.4	2.9	503	24.1	12.9
Mathematical sciences	541	60.3	10.3	403	9.9	3.0
Engineering	465	51.8	30.1	275	2.2	1.5
Life sciences	624	48.7	3.5	783	3.7	1.9
Arts and humanities	2,940	49.0	7.2	1,249	13.1	10.2
Education	1,272	49.8	3.2	219	16.0	11.9

[1] See definition of fields at end of report.
[2] Excludes institutions classified by ACE as universities and medical colleges.
[3] Ninety percent confidence intervals were computed and should be interpreted as (+) or (-).
Source: American Council on Education, March 1978.

EXPECTED CHANGES IN HIRING PATTERNS

Only an insignificant number of institutions anticipated that they will hire proportionately fewer doctorates in the period 1977-82. The survey indicates that the majority of respondents in 4-year schools expects no change in the proportion of new full-time faculty appointments with doctorates in each broad S/E field through 1982. No change was anticipated for S/E fields by an average of three-fourths of the respondents in junior and community colleges. Increases in doctoral representation on S/E faculty were expected by about one-third and one-fifth of the respondents at the two levels, respectively. In the two tables below percentages relate to varying numbers of respondents because many schools either do not offer courses in one or more of the fields or did not hire any new faculty in these fields in 1976-77 and hence lack any basis for comparing the future proportion of new faculty with doctorates to the 1976-77 proportion.

Expected changes in the proportion of new full-time faculty with doctorates, 4-year colleges: 1977-82

	Percent of institutions by expected relation of 1977-82 proportion to 1976-77 proportion			
Field	Less than	Same as	Greater than	All 1982 appointees will have doctorates[1]
Physical sciences	0.3	71.8	22.7	5.1
Social sciences	.2	60.0	34.9	4.9
Mathematical sciences	.7	61.3	34.0	4.0
Engineering	.5	63.5	30.3	5.7
Life sciences	1.8	64.4	29.5	4.3
Arts and humanities	1.2	54.1	42.3	2.4
Education	2.5	52.7	39.2	5.6

[1] These percents do not include some schools which already hired only doctorates in 1976-77.

Source: American Council on Education, March 1978.

Expected changes in the proportion of new full-time faculty with doctorates, 2-year colleges: 1977-82

	Percent of institutions by expected relation of 1977-82 proportions to 1976-77 proportions			
Field	Less than	Same as	Greater than	All 1982 appointees will have doctorates
Physical sciences	1.0	74.6	24.2	0.1
Social sciences	2.4	68.8	27.4	1.4
Mathematical sciences	.5	79.1	20.4	0
Engineering	1.2	87.7	11.1	0
Life sciences	.9	76.3	21.5	1.3
Arts and humanities	2.8	62.5	33.3	1.3
Education	2.4	81.4	13.8	2.4

[1] These percents do not include some schools which already hired only doctorates in 1976-77.

Source: American Council on Education, March 1978.

WHY 2-AND 4-YEAR COLLEGES DO NOT HIRE MORE NEW FACULTY WITH DOCTORATES

Why have these colleges not taken greater advantage of the seemingly ample supply of new S/E doctorates to upgrade the academic credentials of their faculties? ACE and NSF staff investigated this question in conversation with representatives of several higher education associations as well as with officials of several schools. These discussions revealed several main factors explaining such hiring practices.

At the 2-year college level, little emphasis is placed on the research skills gained in S/E doctoral training and much more weight is given to teaching ability and, in many cases, to practical experience acquired in industrial employment. Thus, community and junior college administrators might prefer an experienced high school science teacher with proven instructional skills and interest in students or a mechanical engineer with several years employment in industry over a young Ph.D. just graduated from a major research university. Some administrators also suspect that doctorates join 2-year college faculties as a last resort and are very likely to leave when a senior college position becomes available. A few universities have initiated programs to train some doctoral students specifically to teach in 2-year institutions. Graduates of these programs have readily found employment at community and junior colleges.

At 4-year institutions three factors account for not requiring doctorates of essentially all new faculty. Probably the chief reason for hiring master's degree-holders is that administrators are anxious about possible declines in enrollments in the next few years. The institutions prefer to keep their flexibility by hiring temporary staff. Nondoctorates, who in most schools are more likely to be in nontenure positions, are considered to be easier to discharge. Also, many new doctorates are more reluctant to take a temporary position than are those with master's degrees.

The second factor mentioned by representatives of 4-year schools is that doctorates expect to earn higher salaries than do nondoctorates. Many baccalaureate-granting schools are experiencing financial difficulty and the savings made possible through hiring nondoctorates influence their hiring decisions.

Finally, many schools are attempting to increase the representation of minorities and women on their faculties. In several S/E fields few blacks or females receive doctorates and those who do are also sought by universities and industry. Schools with limited graduate programs, or none at all, often have trouble competing for these individuals and, accordingly, turn to female and minority faculty candidates without doctorate degrees.

Field Definitions

Arts and humanities: Includes English, foreign languages, communications, fine and applied arts, and related fields

Life sciences: Includes biology, botany, zoology, ecology, embryology, entomology, genetics, nutrition, plant pathology, plant physiology, anatomy, biochemistry, biophysics, microbiology, pathology, pharmacology, physiology, agriculture, natural resources, and related fields

Education: Includes elementary, secondary, higher, adult, special, and related fields of education

Engineering: Includes aeronautical, architectural, biomedical, ceramic, chemical, civil, electrical, engineering sciences, environmental health engineering, geological, industrial, mechanical, mining, nuclear, petroleum, and all other forms of engineering. (Excludes engineering technologies.)

Mathematical sciences: Includes mathematics, statistics, computer sciences, data processing, systems analysis, and all related fields

Physical sciences: Includes chemistry, earth sciences, physics, geology, meteorology, astronomy, metallurgy, geophysics, pharmaceutical chemistry, and related fields

Social sciences: Includes agricultural economics, geography, economics, anthropology, archeology, linguistics, sociology, government (political science), demography, and psychology. (Does *not* include history, social work, public administration, and other applied fields, which should be reported under "social sciences, other.")

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